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AN ABORIGINAL QUARTZITE
QUARRY IN EASTERN
WYOMING.

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CONTENTS.

	PAGE.
Introduction, - - - - -	235
Location and recent history of the quarry, - - - - -	237
The route to the quarry, - - - - -	237
Quarrying operations by means of excavations, - - - - -	238
Nature of occurrence and character of material quarried, - - - - -	238
Character of work done in the pits, as determined by exposed quartzite stratum in ravine, - - - - -	239
Hammer-stones, - - - - -	240
Rejects and flakes, - - - - -	240
Material found about the tipi circles or shop sites, - - - - -	241
Age and occupation, - - - - -	242

ILLUSTRATIONS.

PLATE.

- XXVIII. North wall of ravine with exposed stratum of quartzite.
- XXIX. More detailed view of quartzite stratum, showing colored masses or
geodic phases.
- XXX. Section of quartzite stratum with jasper nodules in situ.
- XXXI. General character and contour of pits.
- XXXII. More detailed view of pits, showing extent of workings.
- XXXIII. Compact masses of quartzite used as hammer-stones.
- XXXIV. Typical rejects from neighborhood of pits.
- XXXV. Additional rejects from pits.
- XXXVI. Typical flakes from pits.
- XXXVII. Typical rejects and flakes from neighborhood of tipi circles.
- XXXVIII. Characteristic scrapers from neighborhood of tipi circles.
- XXXIX. Lower milling-stone found within a tipi circle.

INTRODUCTORY.

Stone implements of various forms which have been collected from the present Indian tribes of Wyoming and neighboring States are rather familiar objects in museum collections. These implements comprise the well known maul or hammer used in crushing berries and meat, arrow planes, and the simple flakes and rudely chipped implements used in the dressing of hides. In addition are a number of other stone objects, nearly all of which are used for various domestic purposes. Among them are occasionally arrow or spear points of flint, but as a rule objects of flint are not encountered among these collections. That the Indians of Wyoming used countless numbers of arrow and some spear points of flint there is no doubt, but I am not aware that large flint knives or flint agricultural implements have ever been collected among or found in use by these Indians. Hence the added interest attaching itself to a quarry where the rejectage indicates that the manufactured objects sought after were large knives, and, above all, agricultural implements.

AN ABORIGINAL QUARTZITE QUARRY IN EASTERN WYOMING.

LOCATION AND RECENT HISTORY OF THE QUARRY.

The quarry is situated near the central southern border of Converse County and within a few miles of Laramie County. It is about half way between the towns of Keeline on the Fremont, Elkhorn and Missouri Valley Railroad and Glendo on the Union Pacific, Denver and Gulf Railroad. It is not, however, accessible from either of these stations.

My attention was first directed to the quarry by Mr. E. S. Riggs of the Geological department of the Field Columbian Museum. Mr. Riggs, while on a paleontological expedition to Wyoming in 1895, passed over a portion of the quarry and readily recognized its nature. Mr. Walter C. Wyman, of Evanston, Illinois, also heard of the quarry and in April of this year brought to the Museum a few specimens which had been collected by Judge Eastman, of Chicago, in company with Mr. Sidney Bartlett, of Cheyenne, in 1899. Mr. Bartlett had previously visited the quarry in 1893 and wrote a brief account of it, which appeared in the *San Francisco Examiner*. Messrs. Lauk and Stein, two ranchmen living in Whalen Cañon, heard of the quarry in 1882 from some cowboys and for a long time it was known as the "Mexican mine." Indeed, so strong was the impression that the quarry was an abandoned "Mexican mine," that Lauk and Stein decided to investigate the matter, and in 1886 they made some excavations in the vicinity and in 1891 they hired a man, who worked for several weeks; it is, perhaps, needless to say that the results of these investigations were not satisfactory to the ranchmen.

THE ROUTE TO THE QUARRY.

In May of this year, accompanied by Mr. Stewart Culin, I reached the ranch of Lauk and Stein by using the railroad from Cheyenne to Guernsey and by driving seven miles north from

Guernsey. Nothing could exceed the kindness and generosity of Mr. Lauk and of his partner, Mr. Stein. Their ranch is in a most picturesque spot of Whalen Cañon, and at a short distance from the house are innumerable stone tipi circles, while the ground is strewn with fragments of flint of many kinds, of which I shall speak more fully later on.

Equipped with food and bedding, we left the ranch early one morning with Mr. Lauk for guide, and by driving north and slightly west for about thirty miles we came in the afternoon to the quarry, where we spent the night, returning to the ranch late the next day. Naturally, in such a short time it was impossible to make a thorough examination of the quarry, but the main features were noted and a large amount of material was collected, so that it is possible to give a fairly accurate account of the conditions under which flint was mined by the aborigines before the advent of the white race.

QUARRYING OPERATIONS BY MEANS OF EXCAVATIONS.

The quarry is located on a lofty rounded eminence which, however, attains its height by a very gradual ascent. From the summit one looks off in almost every direction over a vast expanse of treeless sage-brush plain, with no living thing in view except an occasional sage-hen or antelope. Here and there over the surface of the eminence are many pits with a diameter of twenty to fifty feet, and of a depth of from ten to thirty feet. The walls and bottoms of these pits are, of course, covered with flint refuse, which is almost entirely unworked. In the more open spaces between the pits, and especially on the south slope of the eminence, are many stone tipi circles, in one group alone over twenty being noted, some of them so perfect that it seems as though the tipis had been removed but the day before.

NATURE OF OCCURRENCE AND CHARACTER OF MATERIAL QUARRIED.

On the east side of the eminence the grade is rather more abrupt than on the other sides, and near the base of the hill we encounter a deep ravine or wash with vertical walls, thus giving a fine exposure of the character of rock sought after higher up. Examining one of the walls of the wash (see Pl. XXVIII) we find a solid stratum, thirty or more feet thick, of flint, or rather of sandstone,

which had been worked over by silicious waters, thus forming quartzite. This stratum is of variegated color, passing from yellowish brown to violet gray, varied with shades of pink, violet, yellow, purple, etc., the whole stratum thus producing a most beautiful and remarkable color effect. The upper two or three feet of rock is very brittle and does not chip well; indeed, it occurs not as a solid mass, but, owing to long weathering, in long thin sheets or irregular blocks. Lower down, on close examination, there may be found irregularly rounded or elliptical masses which are of a dense and compact nature (see Pl. XXIX). These rounded masses are evidently results from the solidification of silicious water percolating into cavities, thus presenting a geodic phase which is tougher and more coherent than the surrounding quartzite rock, and hence better adapted to a chipping process. Evidently it was these compact masses which the aboriginal workmen were seeking. Also at irregular intervals may occasionally be found small nodules of jasper, and chalcedony, and agatized masses which were also highly prized as they afforded most excellent material for small arrow points, and especially for the small scrapers which are found in so great an abundance around the tipi circles throughout the entire region. Curiously, in two places (see Pl. XXX) were observed jasper nodules projecting from the wall, and they had been much battered, and the surrounding quartzite had received many blows in the vain attempt of the workmen to dislodge them from their position.

All along the wall of this wash was presented evidence of much work. The upper beds of weathered quartzite had been dislocated, probably by means of wooden wedges and bars, to a depth of from seven to fifteen feet, for a distance of several hundred feet. As a result the bottom of the wash, and especially its banks, were covered to a depth of several feet with long, thin, irregular masses usually averaging a foot in length and from two to four inches in breadth. That the proper variety of flint was not easily found until considerable depth had been reached, and not then except at irregular intervals, was apparent from the almost total absence of rejects, flakes, or hammer-stones in the immediate vicinity of the wash.

CHARACTER OF WORK DONE IN THE PITS, AS DETERMINED BY EXPOSED QUARTZITE STRATUM IN RAVINE.

Although there was no time for other than a superficial examination of the pits higher up on the eminence, yet the evidence

afforded by the character of the refuse surrounding and partially filling them leads me to believe that the object of the numerous excavations was similar to that of the work done in the wash (see Pl. XXXI). After the soil had been penetrated, the workmen encountered the upper unworkable rock through which it was necessary to excavate to a considerable depth before the denser masses of workable material and the jasper and chalcedony nodules were encountered (see Pl. XXXII). On account of the broken character of the upper mass of the quartzite bed such excavations were not necessarily difficult operations. Furthermore, it is possible to believe that this work could be carried on with tools similar to those which would be found efficacious in working the exposed stratum down in the valley.

HAMMER-STONES.

We may now examine some of the products of the quarry. Having very recently, previous to my visit in Wyoming, examined with some care the rich and instructive flint quarry at Mill Creek, Illinois, I was immediately impressed with the almost total absence of tools. Of digging or quarrying implements not a single specimen was found, and a diligent search of many hours yielded only some twenty hammer-stones, and those of the simplest nature. Indeed, they were nothing more nor less than rough, irregular, core-like masses of quartzite which, on account of structural characteristics, were not suitable for the manufacture of implements (see Pl. XXXIII). There is nothing particular in their shape, except for the fact that they are of a size which could easily be grasped in the hand, to show that they were hammer-stones. It is only from the presence on one or more sides of a great amount of abrasion, which could come only from long usage in breaking up and blocking out large masses of hard rock, that their true character can be made out.

REJECTS AND FLAKES.

In examining the rejectage about the pits one suffers from the same condition which confronts one at the great chert quarry of Peoria, Indian Territory, namely—the utter lack of knowledge of the finished product. It does not take more than a superficial examination, however, to demonstrate that the material most desired was that which could be worked up either into a long and rather broad lance-

head or into a still larger leaf-shaped implement, which, perhaps, was destined for agricultural purposes. Nothing whatsoever was found in a finished condition and, indeed, specimens in the "turtle back" stage were not numerous. The illustrations (Pls. XXXIV and XXXV) present some of the more characteristic forms of the rejectage, along with a few of the most highly differentiated and completed rejects.

The pits are further characterized by the almost total absence of small flakes, thus showing, as do the rejects, that only the roughest sort of work was attempted in the immediate neighborhood of the pits. Of large flakes, however, many interesting specimens were collected, some of the best examples being shown on Pl. XXXVI. The smallest flake found measured $2\frac{3}{4}$ inches in length, the largest 12 inches.

MATERIAL FOUND ABOUT THE TIPI CIRCLES OR SHOP SITES.

As the refuse about the pits is characterized by the largeness of the rejects and chips, so the exact reverse is true of the material which is found strewn about the ground near the stone tipi circles. No work whatever seems to have been done on the small jasper and chalcedony nodules about the pits, this being reserved for the shop at the tipi. As a consequence a great deal of refuse is here found in small rejects, usually of the leaf-shape pattern, small flakes and small hammer-stones made from jasper or irregularly shaped unworkable nodules. No single specimen of a finished arrowhead was encountered, nor was any reject discovered from which one could safely predict its destined final shape. The fragmentary and unsatisfactory condition of this shop site refuse may readily be seen in Pl. XXXVII, where are reproduced some characteristic hammer-stones, rejects and flakes.

Worthy of notice, not so much from their connection with the quarrying and chipping operations as from their great abundance, are the small jasper and chalcedony scrapers, some of the better examples of which are to be found on Pl. XXXVIII. These were found in surprising quantities, not only about the tipi circles near the quarry but also in the vicinity of the circles on Lauk and Stein's ranch, thirty miles away, and at the innumerable circles encountered on the road between the ranch and the quarry, all of which show evidence of having been shop sites. It is remarkable, however, that at none of the shop sites between the ranch and the quarry did I find any

evidence of the work being done on the large roughed-out leaf-shaped implements which prevail right at the quarry pits.

Among the refuse at the quarry tipi circles were found five specimens which possess some interest. Two were of jasper and had evidently served as drills, one being long and slender and chipped on both sides, the other being a flake which was notched at one end for the purpose of hafting. The other three were fragments of stone hammers such as are commonly used to-day by the Shoshoni and Arapahoe women of western Wyoming for pounding berries, meat, etc. Curiously, the material of these three fragments was different in each specimen, one being of quartz, another of granite, while the third was of diorite.

There remains to be mentioned a flat stone *metate* found near one of the tipi circles (see Pl. XXXIX). This is of quartzite and measures fourteen inches in length by nine inches in breadth, while it does not exceed one inch in its thickest part. This was probably used as the lower milling-stone for grinding corn.

AGE AND OCCUPATION.

In a dry and generally arid region, where the vegetation is scant, it is not to be expected that the quarry with its pits and refuse heaps would be covered to any great extent with vegetable mould, however great their antiquity. As a matter of fact, even such evidence of age as might be expected from this source is almost entirely absent. The exposed material seems as fresh and bright as though operations had ceased but yesterday. At one place on the bank near the ravine I found a great flat slab which evidently served as a seat for some workman. Seating myself on it, I could readily make out the grooves in front of the seat where had rested the legs and feet, while on the right were two hammer-stones of different sizes, and all about were chips, refuse, and many rejected and partially roughed-out implements. The whole place suggests suspended operations and a temporary abandonment. What tribe or tribes worked the quarry is, of course, not possible now to determine, but that mining was carried on here extensively and through a considerable period of time there is no doubt. Furthermore, the great number and wide extent of the tipi circles leads to the belief that permanent encampments were made right at and in the vicinity of the quarry. It seems probable that the work was done by some of the Plains Indians and within a comparatively recent period, but before the advent of the white race

in this region. There is also reason to believe that the people who worked here practiced agriculture to a very considerable extent, for it is difficult to form any other conclusion regarding the greater number of rejects found about the quarry than that they were intended for agricultural implements.

That there is a rich field for archæological exploration in the vicinity of this quarry, and that many problems still unsolved but well worthy of solution remain in regard to the quarry itself, I am fully aware, and to a thorough investigation of the region I expect to devote some time during the coming summer.



WALL OF RAVINE WITH EXPOSED STRATUM OF QUARTZITE.



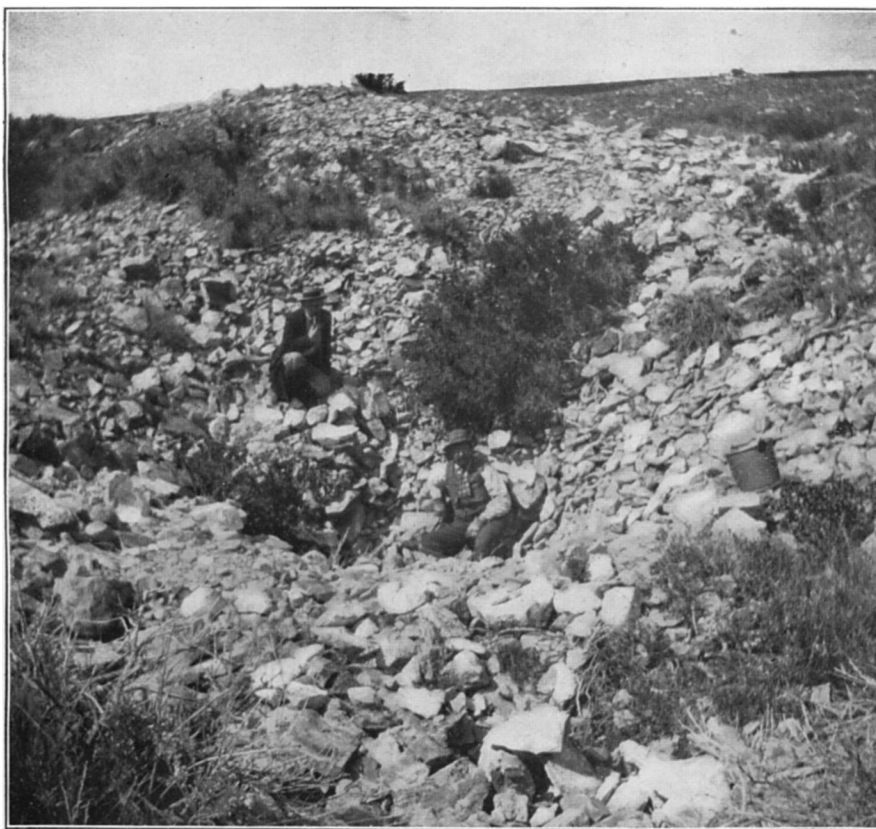
DETAILED VIEW OF QUARTZITE STRATUM, SHOWING COLORED MASSES OR GEODIC PHASES.



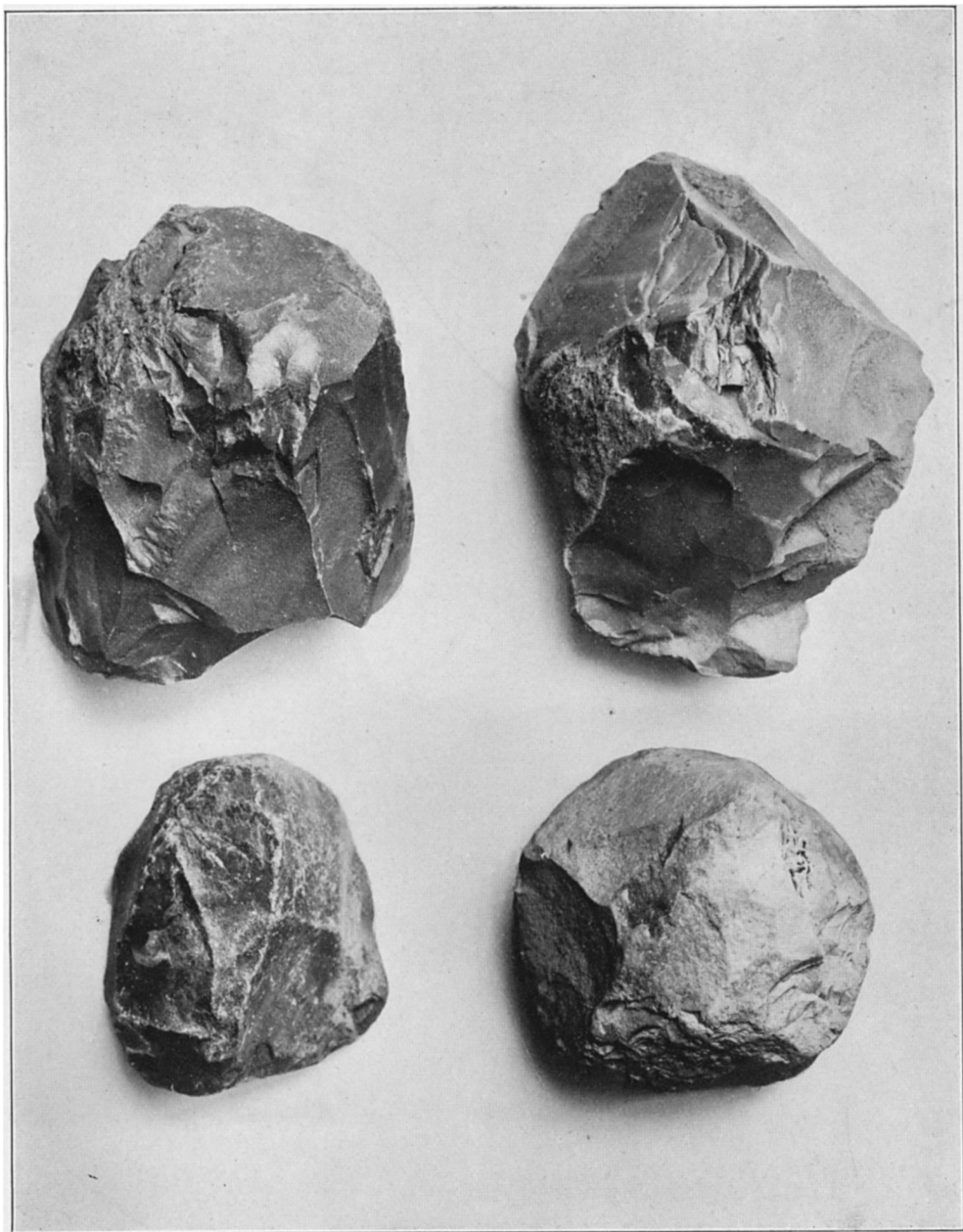
UPPER QUARTZITE STRATUM SHOWING JASPER NODULES.



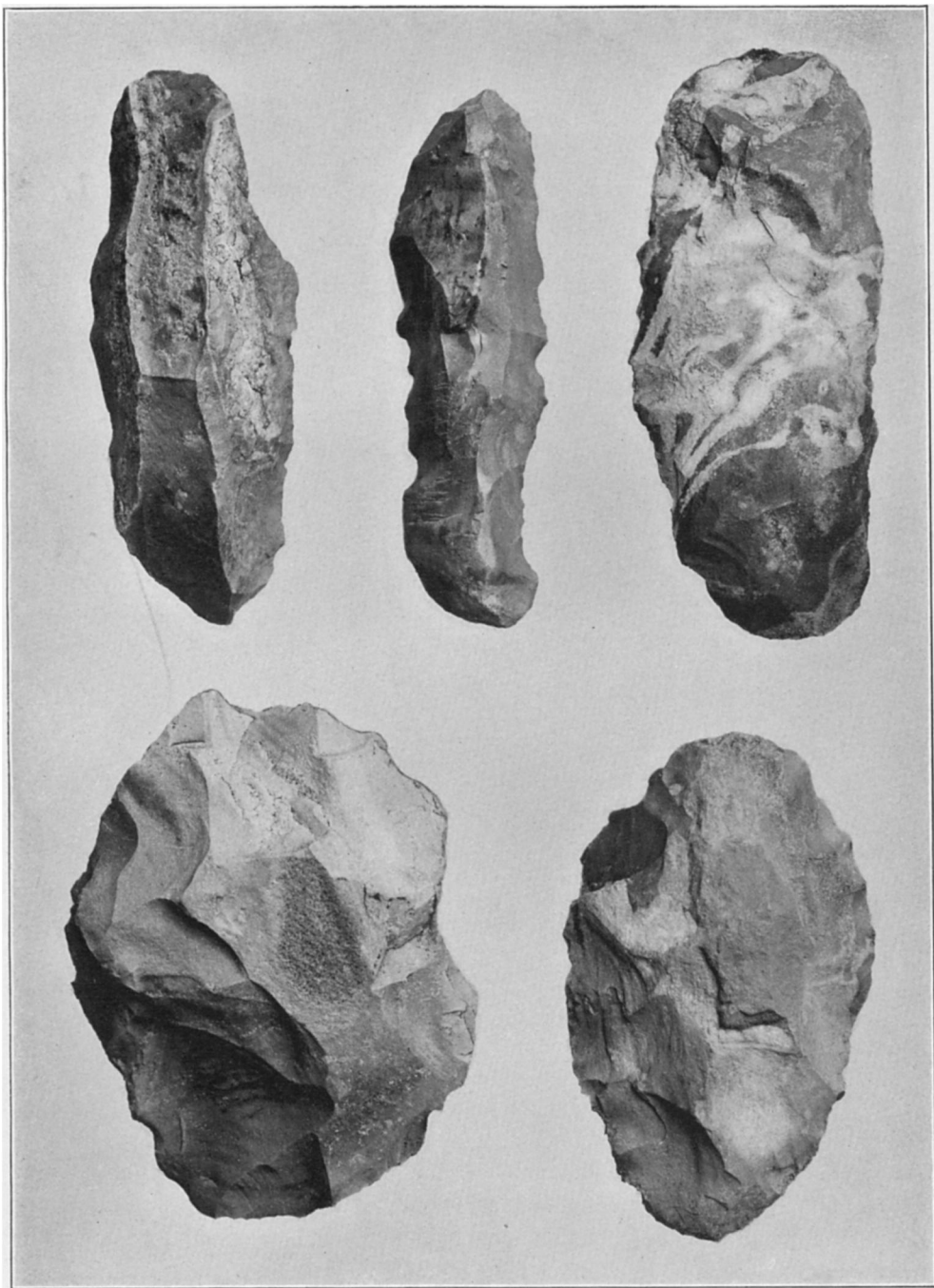
GENERAL CHARACTER AND CONTOUR OF PITS.



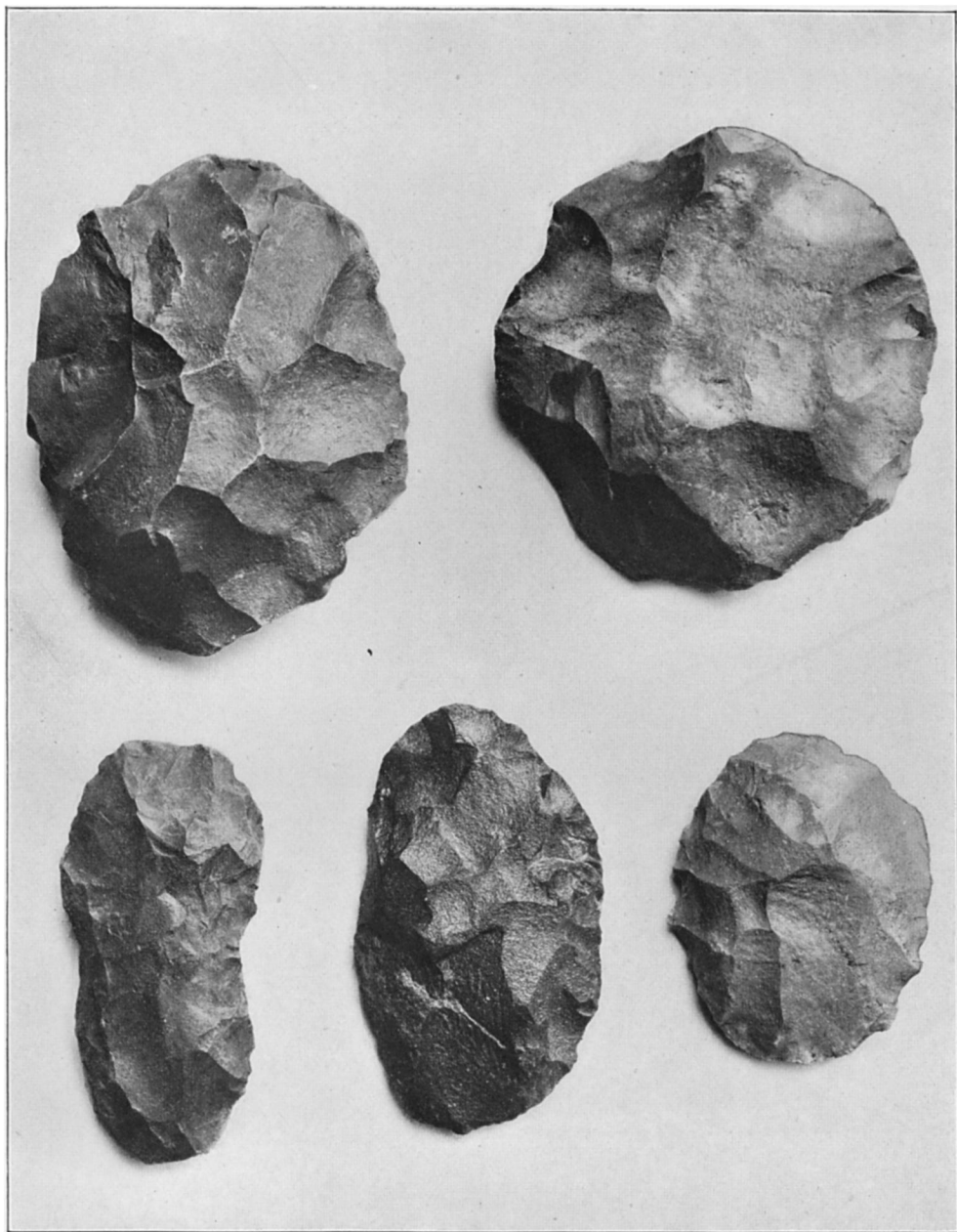
DETAILED VIEW OF PITS, SHOWING EXTENT OF WORKINGS.



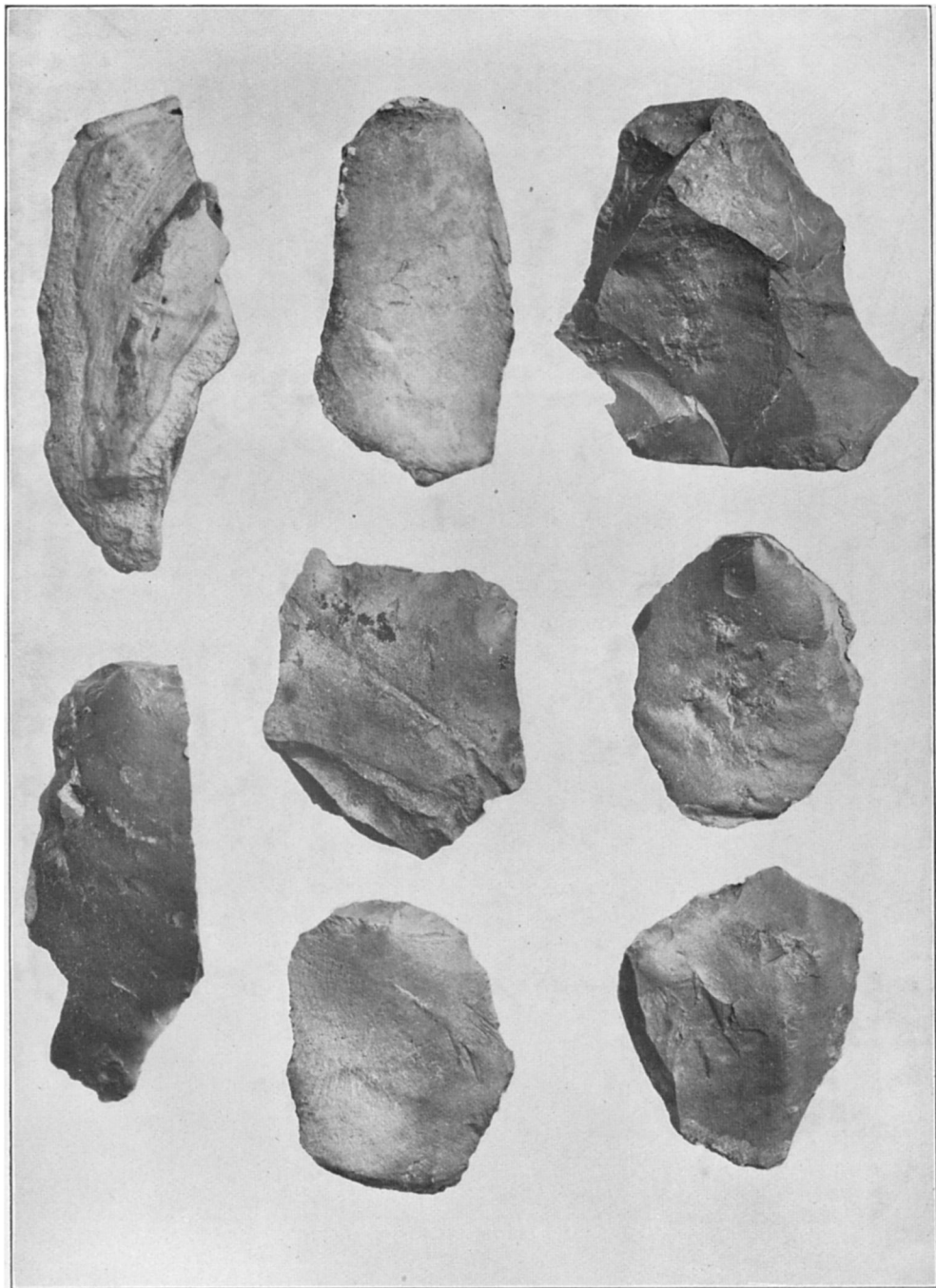
COMPACT QUARTZITE MASSES USED AS HAMMER-STONES.



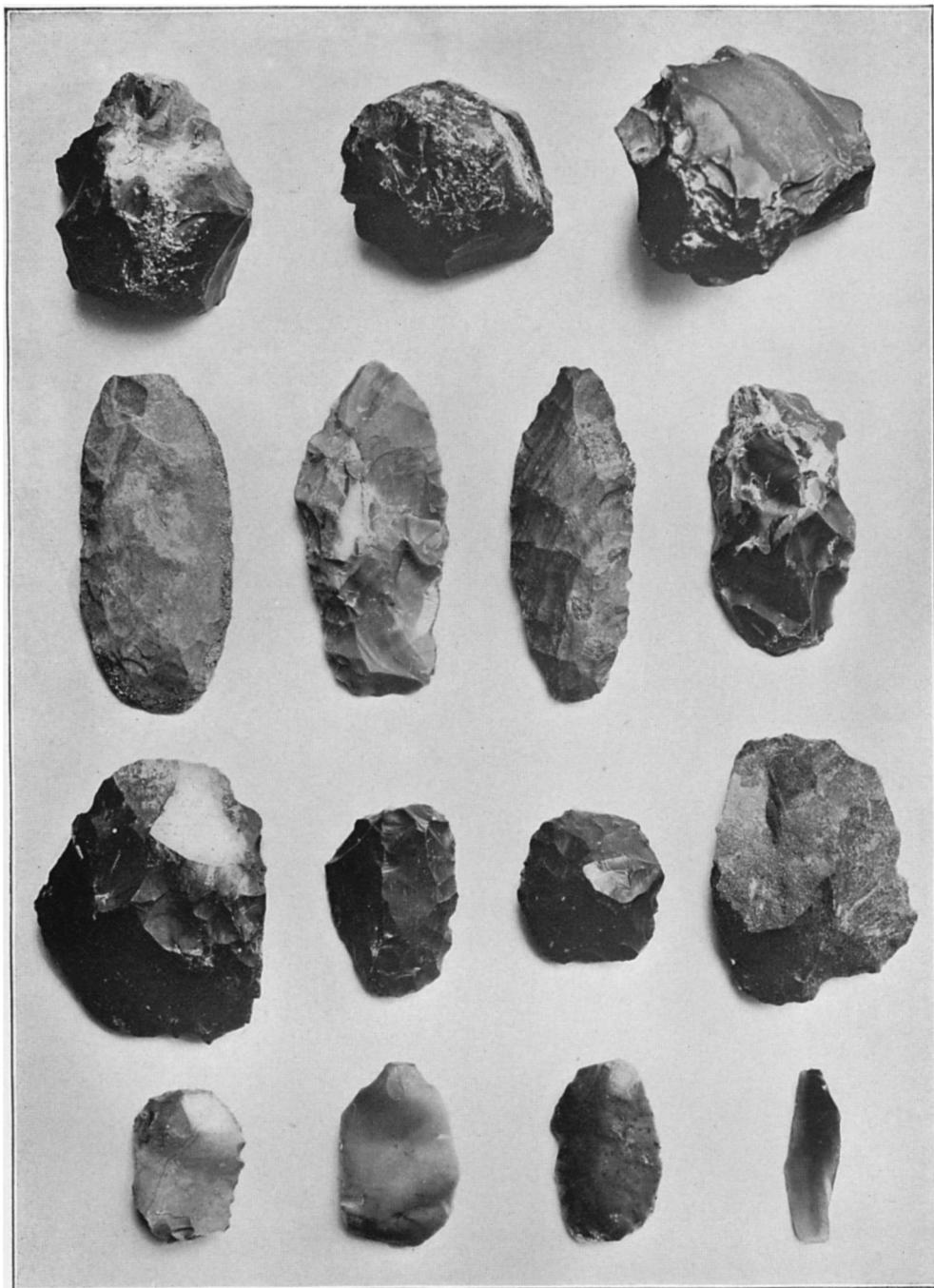
TYPICAL REJECTS FROM NEIGHBORHOOD OF PITS.



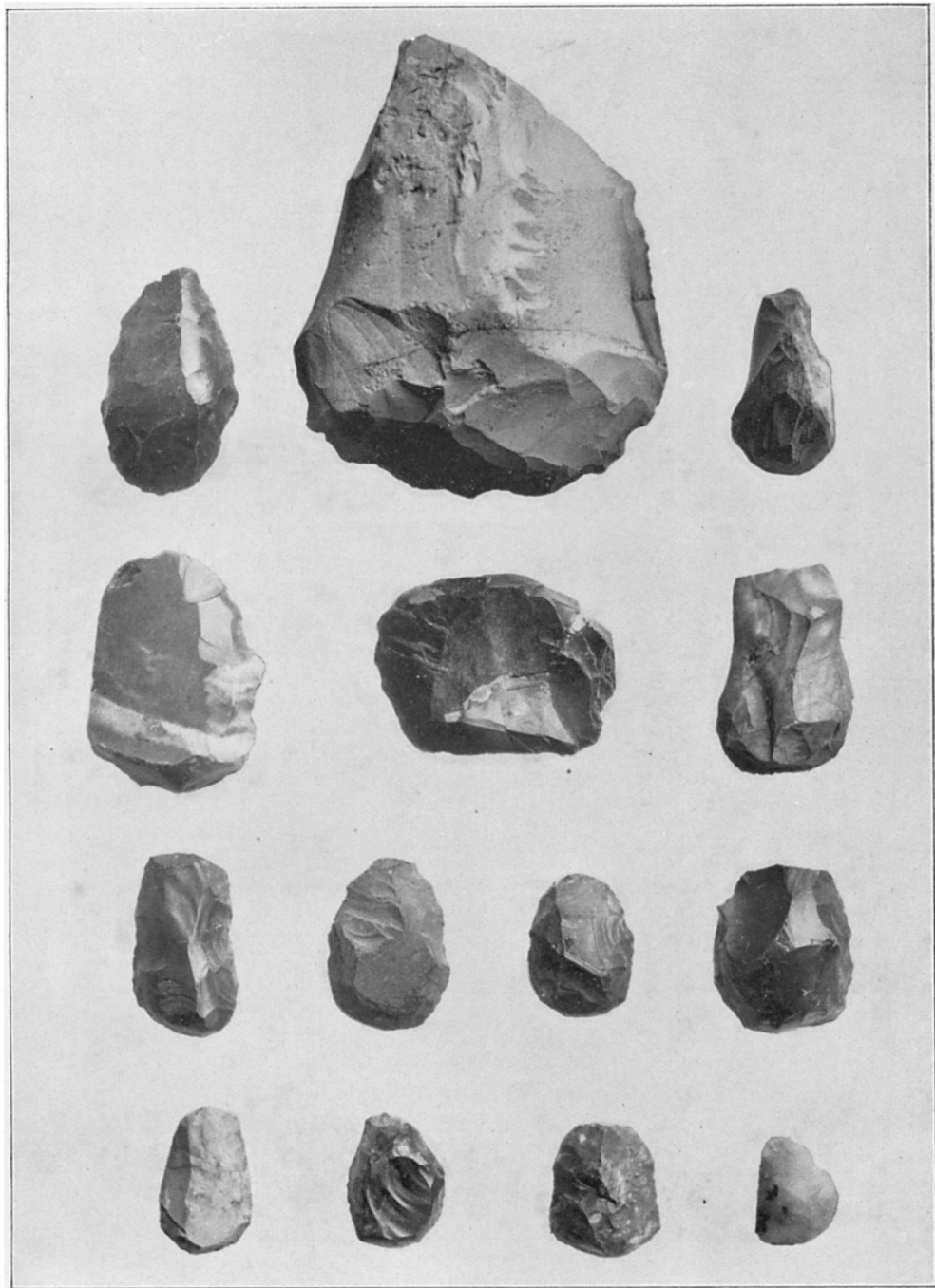
TYPICAL REJECTS FROM NEIGHBORHOOD OF PITS.



TYPICAL FLAKES FROM PITS.



TYPICAL REJECTS AND FLAKES FROM NEIGHBORHOOD OF TIPI CIRCLES.



CHARACTERISTIC SCRAPERS FROM NEIGHBORHOOD OF TIPI CIRCLES.



LOWER MILLING STONE FOUND WITHIN A TIPI CIRCLE.